Tariff Liberalization and Trade Integration of Emerging Countries

Anne-Célia Disdier, Lionel Fontagné, Mondher Mimouni

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Abstract

This paper investigates how tariff liberalization has affected exporting at the product-destination level in emerging countries. We use a highly disaggregated (6 digit level of the harmonized system – HS – classification) bilateral measure of market access to compare tariffs applied in 1996 and 2006, which includes the timing of the Uruguay Round and episodes of bilateral liberalization. Our econometric estimations consider impacts of tariff cuts on three components of the trade margins: extensive margin of entry (new trade relationships at the product-destination level), extensive margin of exit (disappearance of existing relationships) and intensive margin of trade (deepening existing relationships). Our main estimates indicate that a reduction of bilateral applied tariffs of 1 percentage point increases the extensive margin of entry by 0.1% and the intensive one by 2.09%, while it reduces the extensive margin of exit by 0.25%.

JEL classification: F13, F15
Keywords: tariffs, trade liberalization, emerging countries, margins of trade

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1 Introduction[1]

This paper provides an ex post assessment of how emerging economies' exports have been affected by the reduction in tariffs associated with the most recent episode of large scale trade liberalization and continuous expansion of bilateral agreements.[2]

The last successful round of multilateral negotiations – the Uruguay Round – was concluded in Marrakech in April 1994 and implemented in the ten years 1995-2005, i.e. in a period when several developing countries emerged. Tariffs on industrial goods were reduced by 40%[3] and the two sectors consigned to the fringes of the multilateral system – agriculture and textile and clothing – were reintegrated within the normal discipline of the multilateral trade system. The conclusions of the agreement were enforced for tariffs on goods for a five year period starting January 1, 1995. For agriculture, the implementation period for the country-specific commitments was six years for developed countries. In accordance with the Special and Differential Treatment principle, developing countries were allowed up to 10 years for implementation of their commitments.

Thus, the Uruguay Round – and more generally the related period of intense tariff dismantling including bilateral trade agreements – provides a good case to study comprehensive reductions in tariffs at world level. It is especially interesting since during the period of implementation of the agreement, the rapid emergence of new players on world markets profoundly reshaped trade patterns.

Beyond tariffs, additional trade policy changes took place in the ten-year period under observation. The signatory countries established the World Trade Organization (WTO) and concluded an ambitious agreement covering numerous issues including non-tariff measures, anti-dumping, subsidies, intellectual property, trade related investment measures, dispute settlement mechanisms, a reduction in tariff escalation[4] and the termination on January 1, 2005 of the transitional Agreement on Textiles and Clothing (ATC).[5] Against this background our focus is the impact of tariff dismantling on emerging countries exports and to estimate its impact on the magnification of existing

[1]We are grateful to two anonymous referees for valuable comments and suggestions. We are deeply indebted to Xavier Pichot for his help in constructing our raw dataset of tariffs. We thank the two referees and participants at ETSG 2011, FREIT-EITI 2013, RIEF 2013, CEPII seminar and Geneva Trade and Development Workshop for helpful comments. Part of this research was funded by the Agence Nationale de la Recherche (ANR), under grant ANR-12-JSH1-0002-01.

[2]A large body of literature examines *ex ante* what might be the outcome of the Round (e.g. Harrison et al. (1997) based on a sectoral CGE approach and focusing on overall welfare gains. Here we adopt an *ex post* approach which does not limit our investigation to the effects of the Round *per se* but includes the impact of the tariff cuts more generally - whether multilateral, bilateral or even unilateral.

[3]More precisely, 40% for developed countries, 37% developing countries and 25% least developed countries.

[4]Tariff escalation occurs when tariffs increase with the value added in the final product, e.g. tariffs are higher on canned fruits than on fresh fruits.

[5]The ATC substituted for the bilateral quotas negotiated under the Multifiber Arrangement (1974-94).

trade flows and the creation of new flows.

To what extent tariff dismantling contributed to the emergence of new super traders such as China, and to a surge in exports from emerging countries more generally, remains an open question. Apart from these trade policy changes, other determinants may have played a role, including the economic growth of importing and exporting countries, the upward shift in the comparative advantage of exporting countries associated with their Gross Domestic Product (GDP) per capita growth, the drastic reductions in transport costs due to containerization, the increase in foreign direct investments, and the development of global value chains and technological capabilities (Yi, 2003; Hanson, 2012). The emergence of new trade flows may also be driven by political factors and a reduction in the country risk.

If we focus only on the actions taken by the WTO, other dimensions such as the set of rules providing multilateral trade discipline and the accession of new members may have played a role.[6] Similarly if we focus on tariffs, not everything relies in tariff cuts. By binding their tariffs, WTO members offer market access security to potential export partners, which affects individual firms' market entry decisions.[7] This reduced uncertainty is expected to have a positive impact on the extensive margin of trade (Francois and Martin, 2004). Sala et al. (2010) find clear theoretical evidence of this mechanism in a heterogeneous firm framework, and present a numerical simulation of how market access responds to cuts in bound rates even in presence of a binding overhang.

In the case of emerging countries, we examine the extent to which cuts in the applied tariffs faced on exporting markets led to zero trade flows turning positive (the extensive margin of entry) or reduce the probability of flows' disappearance (the extensive margin of exit), and the impact on the value of existing export flows (the intensive margin). These margin definitions are similar to those usually applied in the trade literature (see e.g. (Besedeš and Prusa, 2011)).[8] Our sample includes 18 emerging exporting countries and 25 importing partners. The period 1995-2005 corresponds to full implementation of the Uruguay Round agreement. However, our analysis starts in 1996 because

[6] Rose (2004) argues that WTO membership has no effect on trade but takes no account of the shift from zero to positive trade flows – the so-called extensive margin of trade. These new flows correspond to new products shipped by incumbent exporting countries to a given destination market or by countries exporting for the first time to a given market. Accounting for this margin and using aggregated flows, Felbermayr and Kohler (2007) find that belonging to the WTO makes a difference for countries that otherwise would never have traded bilaterally.

[7] Tariff binding is the commitment to not increasing a tariff in the future without accompanying compensation offered to trade partners. Tariffs can be bound at above the currently applied tariff, in which case there is a binding overhang.

[8] Cheptea et al. (2014) consider all trade flows except intra-EU trade and mineral, specific, and non-classified products, and show that in 1994 only 4.5% of potential trade flows at the HS 6-digit level were observed, and in 2007 5.9%. Using HS6 export flows for 126 exporting countries to 59 importing countries in 1995, Hummels and Klenow (2005) find that the extensive margin of trade accounts for more than 60% of the increased exports of larger economies. However, the link between export development and new flows is not systematic, as stressed by Amiti and Freund (2010) in the Chinese case.

tariff data are available from 1996 in the Harmonized System (HS) classification of traded products, and for the whole 1996-2006 period. We include 2006 to ensure that we fully observe the impact of this episode of trade liberalization. Note that negotiations lead to commitments on bound tariffs which might be higher than applied tariffs: the actual reductions in tariffs may ultimately be smaller than suggested by the evidence on the Uruguay Round commitments. In our sample, the median cut in bilateral applied tariffs at the product level between 1996 and 2006 lies between -4.6% for arms and 9.5% for textiles.

We find that cuts in applied tariffs had an impact on export performances of emerging countries. The trade creation impact of tariff cuts mainly channeled through the increase in existing flows and had limited impact on the creation of new ones. A tariff reduction of 1 percentage point from 10% to 9% increases the exports of emerging countries by 2.09% at the intensive margin. The effect is much lower at the extensive margin (+0.1% for the probability of entry and -0.25% for the probability of exit). These results – especially at the extensive margin – are partly driven by China and its increasing trade diversification. Our estimations also indicates a stronger positive impact of tariff cuts at the extensive margin is found for differentiated goods and at the intensive one for non-differentiated products, which corroborates Chaney (2008)'s predictions. Finally, the positive impact of tariff cuts on the emergence of a new flow in 2006 is linked to the level of initial tariffs.

This paper adds to the literature by using highly disaggregated data for a large sample of countries over a sufficiently long time span to observe the cumulated impacts of a complete episode of multilateral trade liberalization and the development of free trade areas (FTAs). Using aggregated data, Baier and Bergstrand (2001) find that two-thirds of the observed trade growth in the period 1958-60 to 1986-88 is due to GDP growth and only a quarter is the result of tariff reductions. The aggregate evidence is driven partly by new trade flows.

To what extent the aggregate evidence is driven by new trade flows is an important issue, in particular when it comes to emerging economies engaged in the process of diversifying their exports. Kehoe and Ruhl (2013) consider bilateral trade at the 5-digit level of the Standard International Trade Classification (SITC) of products (i.e. 1,836 products) for country pairs engaged in episodes of large-scale trade liberalization. Their results show that changes in the extensive margin of trade are large for many of these episodes. This margin accounts for 9.9% of trade increase between NAFTA members, and 26.0% of the increase in trade between the United States and Chile, China, and Korea. Furthermore, the authors highlight that the extensive margin of trade is hardly influenced by the business cycle. Using bilateral trade data for 90 countries and 137 partners in 2005 from the Comtrade database, and tariffs from the Trade Analysis and Information System (TRAINS)

database, Flam and Nordström (2007) compute gravity equations to explain the extensive and intensive margins. They find that tariffs represent significant barriers to trade but due to their limited cross-section data, they were not able to investigate the impact of time variations in tariffs. Relying on a 7-digit product classification, Feenstra and Kee (2007) find a positive impact of United States (US) tariff reductions associated with the NAFTA on the diversification of Mexican exports. They find a 20% increase in exported variety due to the NAFTA. But what is specific to tariff cuts and what is associated with the indirect effects of economic integration (e.g. transfer of technology, foreign investments) remains unclear. Hence, a larger set of experiences of trade liberalization is required. Debaere and Mostashari (2010) rely on the US HS-10 digit classification (comprising some 22,000 different product categories although only half of these were traded continuously throughout the period considered), and US HS-8 tariff data. They examine to what extent US tariff reductions led to increased diversity of imports over the period 1989 to 2000; they find a positive but very limited effect. Finally, the impact of the Uruguay Round on trade margins is investigated in Buono and Lalanne (2012) using individual firm data for France. They consider 147 destinations and 57 sectors and observe a positive effect of tariff cuts on the intensive margin but find no evidence of an impact on the extensive margin. Note that since their paper uses firm data, the margins are defined differently.

In contrast to previous work, we rely on detailed trade data at the product level (HS6 digit level) and tariff information for a large set of importing and exporting countries. We focus on emerging economies' exports, the most dynamic part of world trade, and consider a time window covering the most recent episode of multilateral trade liberalization.[9] In order not to overstate the role of tariff cuts, we consider applied (Most Favored Nation - MFN - and preferential) rather than bound tariffs. Cuts to bound tariffs may be impressive but often have limited impact on applied tariff due to binding overhang. Part of the exercise consists of reconstructing a detailed database of applied tariffs for 1996 using the same method as for 2006, taking stock of tariff preferences, tariff quotas (put in place in the Uruguay round) and specific tariffs. Calculations were made at tariff line level using the MAcMap method (cf. infra) and aggregated to the HS6 level, which is the classification of trade flows. The mechanism linking liberalization and trade which is what we are interested in, goes from applied tariffs to both the extensive and intensive margins of trade. We however performed a robustness check by investigating the reaction of both trade margins to changes in the gap between bound and applied tariffs. Results confirm that changes in tariff ceilings have an impact at the extensive margin of trade as predicted by theory.

[9] Considering several exporting countries makes it impossible to rely on individual firm data.

The rest of the paper is organized as follows. Section 2 presents the data and some descriptive statistics. Section 3 explains the econometric specification and Section 4 discusses the results. Section 5 concludes.

2 Data and descriptive statistics

2.1 Sources and sample

The value added of this paper is to address the above discussed issues relying on a large sample of countries at the most detailed possible product classification level. This comes at a cost: it requires us to use a product classification that is common to the whole sample of countries, which cannot be the country specific tariff line level. Currently, the most disaggregated level common to all countries is the HS6 classification.

We combine two datasets: trade and tariffs at the HS6 level. Regarding trade flows, the BACI (Base pour l'Analyse du Commerce International) database provides exhaustive reconciled trade flows at the HS6 level since 1995. Export values are free on board and equal to the corresponding import values. The reconciliation method follows Gaulier and Zignago (2010).

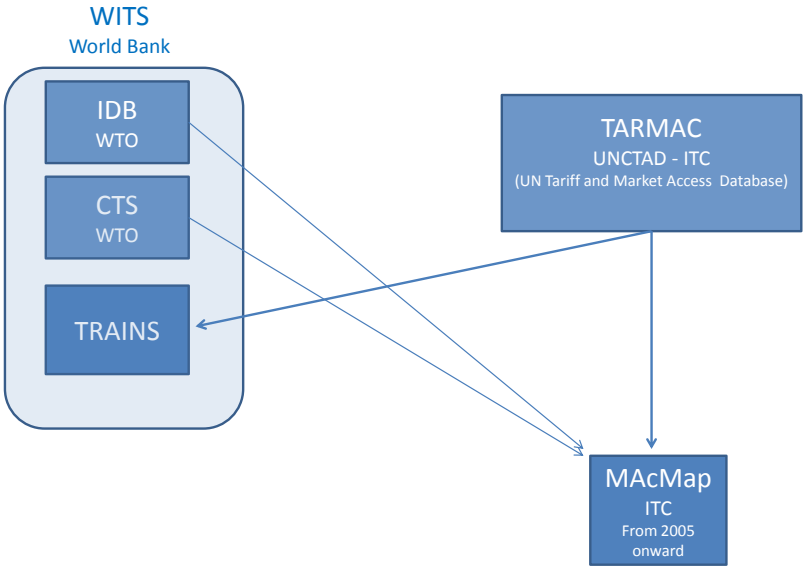
Currently, the main source of information on tariffs for analytical studies is WITS (World Integrated Trade Solution), the World Bank statistics portal. WITS comprises data from the WTO Integrated Data Base (IDB) and WTO Consolidated Tariff Schedules (CTS), and from TRAINS (United Nations Conference on Trade and Development - UNCTAD Trade Analysis and Information System). TRAINS relies on the United Nations Tariff and Market Access Database (TARMAC) developed by UNCTAD and UNCTAD-WTO International Trade Centre (ITC). The second source of information is MAcMap (ITC), which relies on TARMAC, IDB and CTS.[10] MAcMap provides consistent treatment of trade preferences and computation of ad valorem equivalents (AVEs) of specific tariffs (Bouët et al., 2008).[11] We combine these sources of information to obtain a detailed database relying on a common methodology, as described in Figure 1.

The construction of our dataset, applying the MAcMap assumptions, is part of the value added of our paper (see Appendix for a detailed description). Firstly, where available, we rely on tariff

[10] See http://www.cepii.fr/anglaisgraph/bdd/baci.htm for BACI. MAcMap is disseminated on-line on the ITC website (www.intracen.org). The HS6 version commonly used in the literature is on the CEPII (Centre d'Etudes Prospectives et d'Informations Internationales) website. Its last version is documented in Guimbard et al. (2012).

[11] The beta version of MAcMap was published in 2001 (Bouët et al., 2001).

Figure 1: Combination of data sources on tariffs



Source: Authors' construction

line instead of HS6 information for the computation of AVEs of non-ad valorem tariffs and for the treatment of tariff quotas. This ensures greater accuracy of unit value treatment because we reduce the usual aggregation bias (two tariff lines with very different unit values averaged within an HS6 position). Tariffs at the HS6 level are computed as a simple average of the tariffs in the tariff lines of every country (in order to neutralize the impact of differences in the structure of schedules beyond the 6-digit level).

Our empirical analysis focuses on the bilateral exports of emerging countries to their main partners. As yet there is no consensus on either the definition of "emerging economies" or the list of countries included in that group. Therefore we rely on the classifications provided by six institutions (International Monetary Fund, UNCTAD, CEPII, Morgan Stanley Capital International, London Stock Exchange and the G20 group) and consider a country is an emerging country if it is classified as such by at least three of these six institutions. The Boao Forum for Asia in its 2009 annual report provides a list of countries defined as "emerging" by each of these institutions (Boao, 2010). Our sample includes 18 emerging exporting countries: Argentina, Brazil, Chile, China, Colombia, Egypt, India, Indonesia, Malaysia, Mexico, Pakistan, Peru, the Philippines, Russia, South Africa, South Korea, Thailand, and Turkey.

In relation to importing countries, our sample includes all main partners of the emerging countries, and covers around 75% of world exports of emerging countries both in 1996 and 2006. We consider the following 25 importing countries: Argentina, Australia, Brazil, Canada, Chile, China,

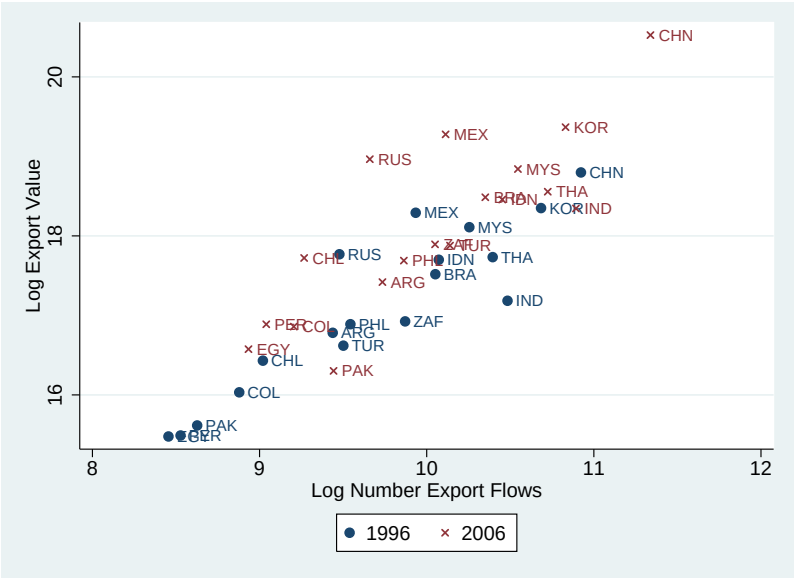
EU15, India, Indonesia, Israel, Japan, Malaysia, Mauritius, Mexico, Norway, the Philippines, Singapore, South Africa, South Korea, Sri Lanka, Switzerland, Turkey, USA, Venezuela, and Vietnam.

To combine tariff and trade data successfully, we have to make few choices/assumptions. In different years, and for different importing countries, tariff data are expressed in different versions of the HS classification. We used conversion tables to convert all the series into HS 1992. Where more than one tariff position was available for a given year, HS6 product, and importing and exporting countries, we took the average. Our final sample includes 4,870 HS6 products present in 1996 and 2006.

2.2 Descriptive statistics

Figure 2 provides export values and number of product-destination categories exported by each emerging country to the set of importing partners and for the products included in our sample. Comparison of 1996 and 2006 observations indicates a net increase on both dimensions (flows and values) for each emerging exporting country. Thus, we need to disentangle the impact of tariff cuts on the two dimensions of trade expansion.

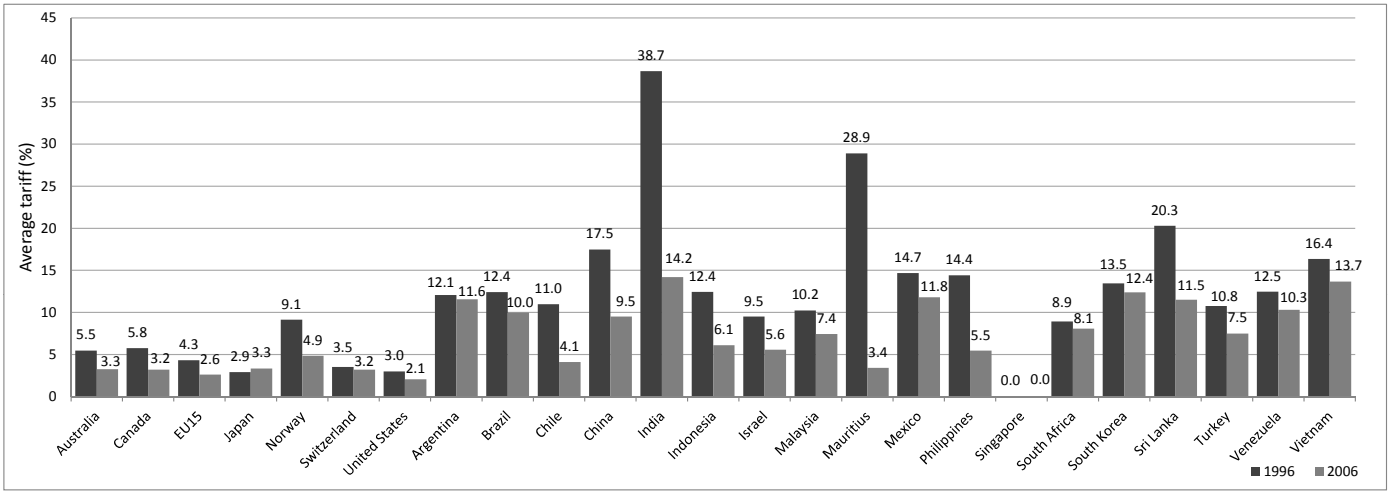
Figure 2: Export value and product-destination flows



Note: Each observation is an emerging exporting country. 'Number Export Flows' is the number of product-destination categories exported by an emerging country. (Max. number of products: 4870; Max. number of destinations: 24 or 25 depending whether the emerging country is also included as importer in our sample). 'Export Value' is the value that an emerging country exports to the (24 or 25) importing countries included in our sample. Source: Authors' calculation, MAcMaps & BACI

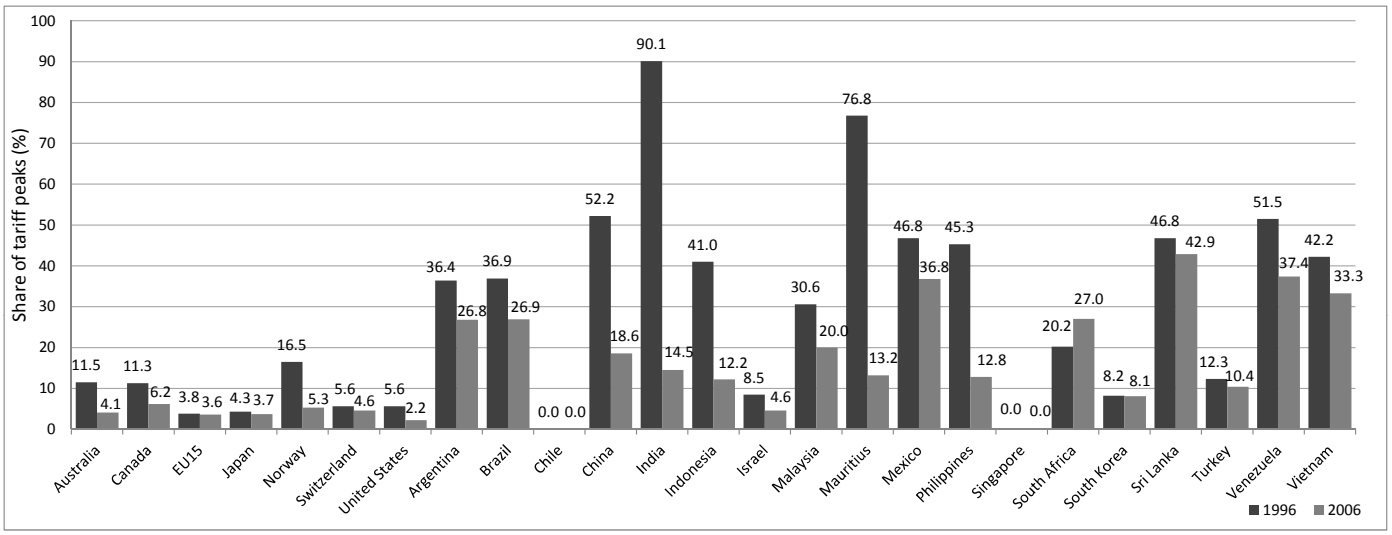
Figure 3 and Figure 4 present the applied tariff cuts during the period of trade liberalization associated with implementation of the Uruguay Round. Not all these cuts are associated with the Round however: certain countries (e.g. India) would likely have cut their tariff unilaterally over that period. Figure 3 reports the simple average tariffs computed for the 4,870 HS products included in our sample and applied by each importing country to its imports from emerging partners in 1996 and 2006. For all countries (except Japan where we observe a slight increase mainly related to specific tariffs), we observe a significant decrease in the average tariff over the decade considered. As expected, the average tariffs applied by main developed countries (Australia, Canada, EU15, Japan, Norway, Switzerland and the US) are on average smaller than the ones applied by other importing countries (4.9% vs. 14.7% in 1996; 3.2% vs. 8.5% in 2006). However, the decrease in these averages observed between 1996 and 2006, is lower for main developed countries than for other countries. For main developed countries, the average tariff was low in 1996 and the percentage changes in protection correspond to trivial absolute changes in the mean. Note that there are significant differences among importing countries in terms of tariff dispersion; in 2006, South Korea, Malaysia, Norway and Turkey present the highest dispersion rates. Figure 4 describes the share of tariff peaks, i.e. tariffs above 15%. Here, also, we observe significant variation across countries, but for all (except South Africa) the share decreases between 1996 and 2006. However, for seven countries (Argentina, Brazil, Mexico, South Africa, Sri Lanka, Venezuela, and Vietnam) it remains above 25% in 2006.

Figure 3: Average tariffs on imports from emerging countries, by importing country (%)



Source: Authors' calculation

Figure 4: Share of tariff peaks (i.e. tariffs above 15%) on imports from emerging countries, by importing country (%)



Source: Authors' calculation

Did emerging countries benefit from lower tariffs and higher tariff cuts between 1996 and 2006, than other groups of exporting countries? If we consider all importing countries, the emerging partners face an average tariff of 11.9% in 1996 and 7.0% in 2006, while the median tariffs are 7.4% in 1996 and 2.5% in 2006. If we now decompose by groups of importers: In main developed markets, emerging countries faced an average tariff of 4.9% in 1996, while other developing and least developed countries (DCs and LDCs) were faced with slightly lower average tariffs (4.5% in 1996) due to tariff reductions and exemptions granted as part of the development policy. Developed countries faced higher tariffs (5.6% in 1996). All groups of exporters experienced tariff cuts between 1996 and 2006, but emerging countries faced the smallest reduction (1.7 percentage points), while the cuts for other DCs and LDCs are equal to 2 percentage points, and to 1.8 percentage points for developed countries. In other markets included in our sample, the differences in average tariffs and cuts over the 1996-2006 period between groups of countries are again rather small. In 1996 (resp. 2006), average tariffs are 14.5% (8.2%) for imports from developed countries, 14.7% (8.5%) for imports from emerging countries and 14.7% (9.3%) for those from DCs and LDCs.

We next turn to trade flows and investigate the variation in exports from emerging countries between 1996 and 2006. We examine both the extensive and intensive margins of trade. Table 1 and Table 2 provide aggregated results respectively for the extensive and intensive margins of trade; Table 3 breaks these results down by exporting countries.

The results show an increase in trade at both the extensive and intensive margins. We observe first the diversification of emerging countries' exports at the product and product-country levels

(Table 1). The average number of HS products exported by emerging countries between 1996 and 2006 increased by 7.3%. This growth is more impressive if we focus on the product-destination dimension. While the number of positive flows still represents less than 24% of total potential flows, this share increased significantly by 39.6% between 1996 and 2006. All in all, these results mean that emerging countries sent existing export products to many more destinations, suggesting that trade costs reduced over the period considered. Second, emerging countries experienced a strong increase in trade at the intensive margin. Table 2 highlights how world exports from emerging countries multiplied more than three-fold between 1996 and 2006. Furthermore, the share of emerging countries exports in imports of countries included in our sample increased by around 10 percentage points between 1996 and 2006. Interestingly, most of the expansion in emerging countries' exports took place with other emerging countries. At the extensive margin of trade, the increase in the number of positive flows between 1996 and 2006 reached 51.1% if we focus only on exports to other emerging countries (versus 39.6% if we consider all importing countries included in our sample). At the intensive margin also, emerging exports were reoriented slightly toward other emerging markets over the period. In our sample, the share of emerging exports sent to emerging partners rose from 23.5% in 1996 to 27% in 2006.

Table 1: Extensive margin of emerging countries exports

	Potential number	Effective number		
		1996	2006	Variation (%)
Product dimension				
Total number of HS6 products	4,870	4,870	4,869	-0.02
Average number of HS6 products	4,870	3,578.6	3,840.9	7.33
Product-destination dimension				
Total number of product-destination categories (non-zero trade)	2,133,060	366,501	511,774	39.6

Notes: For the 4,870 products, 18 emerging exporting countries and 25 importing countries included in our sample.

Table 2: Intensive margin of emerging countries exports

	1996	2006
Bilateral trade (millions USD)	711,173.6	2,243,432.2
Share that this bilateral trade represents:		
In world exports of emerging countries (%)	75.3	74.0
In world imports of importing countries (%)	23.8	33.3

Notes: For the 4,870 products, 18 emerging exporting countries and 25 importing countries included in our sample. 2006 sample is restricted to trade relationships that were present in 1996.

All emerging countries experienced some diversification at the extensive margin and an increase in their exports at the intensive margin between 1996 and 2006. Table 3 reports the contribution of each margin to the 1996-2006 export growth of emerging countries. Large growth rates of exports

are registered, from 89.8% for Argentina to 462.9% for China. However, Table 3 suggests that tariff cuts between 1996 and 2006 led firstly to an increase in the value of existing export flows of emerging economies. By contrast, the creation of new flows (newly exported product to a given destination) was rather modest. The contribution of the first margin to the overall growth of emerging countries exports over the period is above 74% for all countries in our sample (except for Egypt). The contribution of the extensive margin is much smaller. Regarding the extensive margin of entry (new trade flows observed in 2006 which were not present in 1996), the contribution lies between 3.7% for China (which is already well diversified in the export market) and 62.2% for Egypt. Besides, the contribution of the extensive margin of exit (trade flows present in 1996 but not in 2006) is below 10% for all emerging countries.

Table 3: Decomposition of emerging countries' export growth on the extensive and intensive margins

Countries	Change in total $exports_{1996/2006}$ (%)	Contribution of the extensive margin of entry (%)	Contribution of the extensive margin of exit (%)	Contribution of the intensive margin (%)
All countries	221.8	8.2	-1.7	93.5
Argentina#	89.8	35.1	-9.5	74.5
Brazil#	164.4	17.0	-3.4	86.4
Chile#	263.9	16.4	-2.4	86.0
China#	462.9	3.7	-0.1	96.5
Colombia	128.7	22.6	-3.3	80.7
Egypt	200.1	62.2	-7.6	45.4
India#	220.5	14.9	-1.6	86.7
Indonesia#	114.0	18.4	-2.2	83.8
Malaysia#	108.0	7.5	-2.3	94.8
Mexico#	168.1	2.8	-2.0	99.2
Pakistan	100.0	29.7	-3.9	74.2
Peru	305.2	24.0	-3.1	79.1
Philippines#	122.7	15.6	-2.9	87.4
Russia	230.8	5.7	-3.4	97.8
South Africa#	164.0	17.1	-9.0	92.0
South Korea#	177.3	4.9	-1.5	96.6
Thailand	128.0	16.6	-2.1	85.5
Turkey#	252.2	13.3	-2.3	89.0

Notes: For the 4,870 products, 18 emerging exporting countries and 25 importing countries included in our sample. # denotes Emerging countries that are both exporters and importers in our sample. For the intensive margin, 2006 sample is restricted to trade relationships that were present in 1996.

To summarize, descriptive statistics highlight a reduction in the average tariffs affecting emerging countries' exports to their main partners accompanied by a growth in these exports (at both margins). However, these parallel evolutions are not evidence of export development induced by tariff reductions. Our contribution in this paper therefore, is to investigate whether the observed trade expansion results from the observed tariff reduction or whether other factors are at play.

3 Econometric specification: Trade effects of tariff cuts

Our aim is to estimate the impact on emerging countries' world trade integration of tariff cuts granted by their main trading partners between 1996 and 2006. We decompose the effect for each margin of trade. We analyze whether the new bilateral export relationships set up by emerging countries in 2006 (extensive margin), and the changes in the value of existing export flows between 1996 and 2006 (intensive margin) come from the tariffs cuts granted by their partners over the period. Estimations are in first-differences and use of bilateral applied tariffs.

3.1 Extensive margin of trade

We follow the approach developed by Debaere and Mostashari (2010), which estimates the impact of tariff reductions between 1989 and 1999 on the range of goods exported to the US in 1999. Our dependent variable is the probability of having a new bilateral trade flow in 2006 between countries i and j, i.e. the probability that good k not bilaterally traded in 1996 is exported by the emerging country i to the partner j in 2006 ($\Pr(y_{ijk,t} = 1 | y_{ijk,t-1} = 0)$). Note that this is equivalent to the probability of a switch from 0 to a new existing flow. This choice model can be written in the latent variable representation, with y^*_{ijk} the latent variable that determines whether or not a strictly positive trade flow is observed between i and j on good k in 2006. Our main explanatory variable is the variation in the logarithm of bilateral tariffs[12] applied by country j on imports of good k from country i between 1996 and 2006 ($\Delta ln\tau_{ijk}$).

Tariff cuts may be endogenous to changes in trade flows. One approach to deal with this consists in using instrumental-variable techniques. Critical to this approach is the selection of instruments, which should be correlated with the bilateral tariff cuts but uncorrelated with the changes in bilateral trade flows. As an alternative to IV estimation, we rely on country-pair fixed effects to control for the potential endogeneity of tariffs, following Baier and Bergstrand (2007). Since we are looking at first-differences, country-pair fixed effects aim also controlling for long-run bilateral trade growth shocks (e.g. secular trends in exchange-rates, income, etc.). We also include HS6 product-importing country fixed effects to capture the demand-side growth shocks to products which are likely to influence the tariff cuts.[13] Following the inclusion of fixed effects, our estimated

[12] Since we consider the power of the tariff $(1 + \tau)$, the proportional change in the tariff thus defined is the proportional change in the duty-paid price in the absence of incomplete pass through. See e.g. "Integrated Tariff Analysis System" (ITAS), Australian Productivity Commission, http://www.pc.gov.au/research/economic-models-frameworks/itas2.

[13] We have 4,870×25 = 121,750 HS6 product × importing country fixed effects and 6×25×2 + 12×24×2 =876 country-pair-year fixed effects. To keep the number of fixed effects at a reasonable level, we do not interact HS6 product fixed effects and exporting country fixed effects.

equation is:

$$\Pr\left(y_{ijk,t}|y_{ijk,t-1}=0\right)=\begin{cases}1 & \text{if } y^*_{ijk}>0\\ 0 & \text{if } y^*_{ijk}\leq 0\end{cases} \tag{1}$$

with $y^*_{ijk}=\beta_0+\beta_1\Delta ln\tau_{ijk}+FE_{ij}+FE_{jk}+\epsilon_{ijk}$

This equation is estimated using a linear probability model. The inclusion of fixed effects in a probit would give rise to the incidental parameter problem. The linear probability model avoids this issue. In all regressions, we account for correlation of errors by clustering at country-pair-product level.

In addition to the probability of entry, one can also study the exit transition. Lower tariffs may indeed reduce exit and thereby maintain more product diversity than the one that would prevail in the absence of tariff cuts. In that case, our dependent variable is the probability that good k bilaterally traded in 1996 is no more exported by the emerging country i to the partner j in 2006 ($\Pr(y_{ijk,t}=0|y_{ijk,t-1}=1)$)

3.2 Intensive margin of trade

The effects of tariff cuts on the intensive margin of trade are studying using a similar approach but a different dependent variable. Following Bayoumi and Eichengreen (1997) and Baier and Bergstrand (2001), our dependent variable ($\Delta ln(M_{ijk})$) is the change in the logarithm of the value of bilateral exports of good k from country i to country j between 1996 and 2006. We focus on the deepening of existing trade relations and consider only trade flows that are strictly positive in both 1996 and 2006 (i.e. observations where $y_{ijk,t}=1|y_{ijk,t-1}=1$). The explanatory variables are the same as those in equation (1). The estimated equation is as follows:

$$\Delta ln(M_{ijk})=\gamma_0+\gamma_1\Delta ln\tau_{ijk}+FE_{ij}+FE_{jk}+\eta_{ijk} \tag{2}$$

Equation (2) is estimated using ordinary least squares (OLS) and the error terms are clustered and the error terms are clustered at country-pair-product level.

4 Results

4.1 Cross-section results: Trade effects of tariffs

Before studying the trade effects of tariff cuts, we first check that tariffs are relevant determinants of emerging countries' exports and that our sample provides results in line with the usual gravity estimates found in the trade literature. To do so, we simply pool data for 1996 and 2006 and perform cross-section estimations. Results are reported in Table ST2 of the Appendix. Our estimations account for the size of the countries (proxied by the population), their productivity and purchasing power which are likely to influence the scope and quality of exports (reflected in the GDP per capita in current USD), and their level of development (e.g. their infrastructures, proxied by the GDP per capita based on PPP expressed in 2005 USD). We also control for bilateral distance – a proxy for variable transport costs, as well as countries' contiguity and common language.[14] Finally, we include the competition faced by emerging countries on their export markets by computing a Herfindahl-Hirschman index measuring the concentration of country j's imports in year t.[15] Columns (1)-(3) deal with the extensive margin of trade and columns (4)-(6) with the intensive one. Year and HS6 product fixed effects are included in columns (1)-(2) and (4)-(5), while columns (3) and (6) include country-pair-year and HS6 product-importing country fixed effects.

Results are similar to those usually found in the gravity literature. Populations of both countries have a positive and significant impact on trade. This positive impact simply translates into a size effect.[16] Current GDPs per capita also impact positively and significantly the flows. The magnitude of the estimates is higher for the exporting country and at the intensive margin of trade. This result suggests that productivity and exporting countries' comparative advantage towards new activities certainly play a role. However, GDPs per capita in PPP terms have a stronger impact than GDPs per capita in current dollars, suggesting that the level of development (for example of the infrastructures) of emerging countries has a bigger influence on their probability of exporting good k than their productivity. Regarding the gravity variables, results are as expected: negative

[14] GDP per capita and population are taken from the World Development Indicators. Data on distance, contiguity and common border are from the CEPII database http://www.cepii.fr/anglaisgraph/bdd/distances.htm

[15] This index is calculated by squaring the market share of each exporting country j competing on the import market of good k in country i, and summing the resulting numbers ($H_{jkt} = \sum s_{ijkt}^2$ with $s_{ijkt} = (M_{ijkt}/M_{jkt})$ is the share and M the value of imports). It is bounded between zero and one: the closer to zero, the more diversified the import basket. Note that our results on tariffs are robust to the exclusion of the Herfindahl variable from the estimations.

[16] Our estimations include importing country's population and GDP per capita in order to be coherent with the exporting country's side which uses GDP per capita to measure the productivity or level of development of emerging countries. The sum of the population and GDP per capita coefficients (which is positive in our estimations) can be considered the GDP effect.

impact for distance and positive effect for common border and common language. Interestingly, the importing country's Herfindahl index is always negative and significant, suggesting that the probability and the value of exports between emerging countries and their main trading partners are negatively influenced by the level of concentration of the importing country: the more concentrated the import market, the lower the probability of exporting and the lower the value of exports. Finally, the estimated coefficient on tariffs is negative and significant in all the estimations. Tariffs therefore act as trade barriers and tend to impede exports of emerging countries to their main partners. The trade-reducing effect of tariffs is smaller once their endogeneity is controlled for (columns (3) and (6)) but remains significant. These results highlight that tariffs vary across countries and over time in our sample, suggesting that we can explore the effect of tariffs cuts on the exports of emerging countries between 1996 and 2006. The next tables deal with these questions.

4.2 First-differences results: Trade effects of tariffs cuts

Table 4 shows the impact of tariff changes on emerging countries' exports. In our sample, bilateral tariffs (defined at the product level) may vary into different directions. For 48% of our observations, applied tariffs have decreased between 1996 and 2006, while for 6% of our observations we can notice an increase. For the rest (46% of our observations), tariffs remain unchanged between 1996 and 2006. Table 4 studies the differentiated impact of a tariff variation (positive or negative) on trade flows. Both margins of trade are investigated and for the extensive one, we distinguish between the entry and the exit. The first three columns include the whole set of exporting emerging countries included in our sample (18 countries). However among them, China may be an outlier and may potentially drive our results. China is indeed much more diversified than other emerging countries. In 1996, China already exports 4,735 different HS6 products and this number is equal to 4,817 in 2006 (over a potential number of 4870 products). This is well above the number of products exported by other emerging countries. The difference between China and the rest of emerging exporters is even larger if we look at the product-destination dimension (non-zero trade): in 1996, China serves 47.4% of the potential number of product-destination categories and in 2006, this share reaches 71.9%. Therefore, in the last three columns of Table 4, we exclude China from the set of exporting countries. Our results confirm our suspicions: some results are driven by China.

The top of Table 4 focuses only on observations for which we observe a decrease of tariffs between 1996 and 2006. Tariff cuts reduce the probability for emerging countries to exit the export market in 2006 and increase the value of their export flows between 1996 and 2006 (intensive margin of

trade). Regarding the probability of having a new bilateral trade relationship in 2006 (extensive margin of trade, entry), we observe no effect of tariff cuts when China is included in the set of exporting emerging countries, but a positive and significant effect once China is excluded. These differences on the probability of entry and exit when China is included/excluded can be justifiable as follows: a tariff reduction does not promote the entry of China in the destination market (because Chinese exporters are already present) but may affect its probability of exit. According to the estimated coefficients of the three last columns, our results suggest that a reduction of tariffs of 1 percentage point from 10% to 9% increases the extensive margin of entry by 0.1% and the intensive one by 2.09%, while it reduces the extensive margin of exit by 0.25%. Based, on our results, we can also quantify entries and exits resulting from tariff cuts. For the whole sample (i.e. with China among exporting countries), 1.2% of the entries observed in 2006 are due to the tariff cuts granted to emerging countries between 1996 and 2006. Tariff cuts also induce a reduction of exits equal to 7.1%. Furthermore, new entries and avoided exits represent 3.9% of the flows observed at the extensive margin in 2006. When China is excluded from the sample of exporting countries, we get the following percentages: 8.8% of the entries observed in 2006 result from the tariff cuts and thanks to these cuts, exits have been reduced by 8%. These entries and avoided exits represent 12.3% of the extensive flows in 2006. At the intensive margin, emerging exports (in logs) grew by 21.2% between 1996 and 2006. Without tariff cuts, this growth would have reached 3.3% only. Without China among exporting countries, the percentages are respectively 16.3% and 4.3%. To sum up, between 1996 and 2006, emerging exports (in logs) grew by 52.2% (+21.2% at the intensive margin of trade; +204% at the extensive one). In the absence of tariff cuts, the growth would have been only 35.3% (+3.3% at the intensive margin; +192.1% at the extensive one).

We then examine the impact of tariff cuts on the extensive and intensive margins of trade controlling for the fact that some tariffs have not changed between 1996 and 2006. To do so, we include the observations for which tariffs have not changed between 1996 and 2006 in our sample. Previous conclusions remain unchanged and the only slight observable difference is the positive and significant impact of tariff cuts on the probability of entry even when China is taken into account in our sample of exporting countries. These results suggest some interpretations. Overall, other things being equal, there is an evidence of a tariff reduction conducive to a broader range of exported goods and a larger value of exports from emerging countries in 2006.

The last two parts of Table 4 explore the effect of a tariff increase between 1996 and 2006 on emerging exports. Remember that we use bilateral applied tariffs. Tariffs may therefore increase following a rise of the applied tariffs by the importing country (which is allowed by the WTO if

the applied tariff remains below or equal the bound tariff) or following some variations in the unit value, which may generate some changes in the computation of the HS6 tariff. If we restrict our sample to observations with a strictly positive increase in tariffs, we only observe an impact on the exit margin: a tariff increase tends to raise the probability of exit. If the sample is expanded to observations for which tariffs have not changed between 1996 and 2006, an increase in tariffs augments the probability of exit of emerging exporters from the destination market and has also a negative impact on the intensive margin.

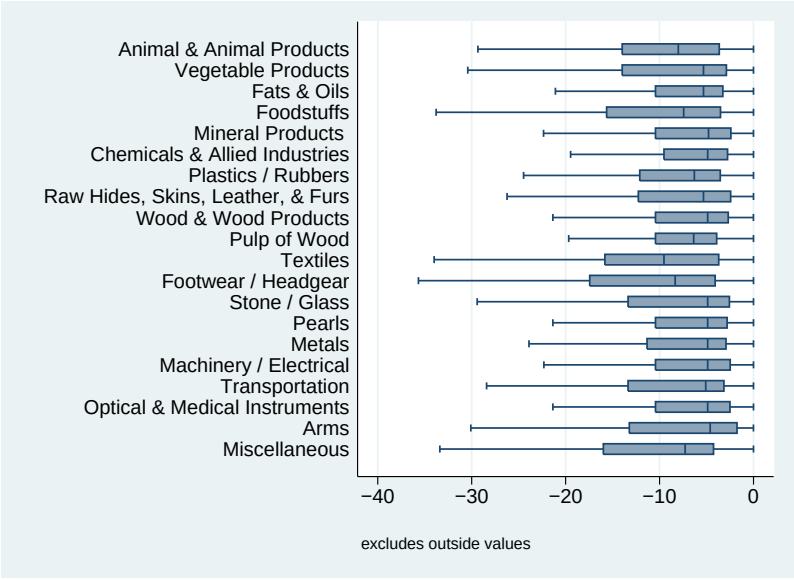
Table 4: Impact of tariff variations on emerging countries' exports

Dependent variable	EM entry	EM exit	IM	EM entry	EM exit	IM
Sample	With China as exporter			Without China as exporter		
Model	(1)	(2)	(3)	(4)	(5)	(6)
Observations with Δ *ln tariffs* < 0						
Δ ln tariffs	-0.016	0.216[a]	-1.765[a]	-0.114[a]	0.274[a]	-2.287[a]
	(0.027)	(0.057)	(0.408)	(0.027)	(0.062)	(0.443)
Observations	838,573	184,024	141,388	812,670	159,909	118,357
R-squared	0.352	0.546	0.503	0.329	0.567	0.490
Observations with Δ *ln tariffs* ≤ 0						
Δ ln tariffs	-0.062[a]	0.206[a]	-1.534[a]	-0.122[a]	0.263[a]	-2.308[a]
	(0.016)	(0.037)	(0.262)	(0.016)	(0.042)	(0.292)
Observations	1,658,352	343,671	263,702	1,600,697	292,264	214,912
R-squared	0.311	0.497	0.446	0.283	0.520	0.429
Observations with Δ *ln tariffs* > 0						
Δ ln tariffs	0.044	0.392[c]	1.809	0.033	0.676[b]	1.861
	(0.053)	(0.234)	(1.527)	(0.054)	(0.281)	(1.919)
Observations	107,397	22,729	17,407	103,646	18,713	13,636
R-squared	0.381	0.581	0.590	0.357	0.614	0.595
Observations with Δ *ln tariffs* ≥ 0						
Δ ln tariffs	-0.017	0.284[b]	-1.844[b]	-0.029	0.285[b]	-2.402[a]
	(0.038)	(0.122)	(0.746)	(0.039)	(0.139)	(0.849)
Observations	927,176	182,376	139,721	891,673	151,068	110,191
R-squared	0.319	0.514	0.466	0.290	0.540	0.451

Notes: EM: Extensive margin of trade. IM: Intensive margin of trade. Robust standard errors clustered by country pair-HS6 product in parentheses. HS6 product X importing country and country-pair fixed effects in all estimations (not reported). Columns (1)-(3): China is included in the set of exporting countries. Columns (4)-(6): China is excluded from this set. [a] p<0.01, [b] p<0.05, [c] p<0.1.

As our main research interest lies in tariff cuts granted to emerging countries, our sample in the subsequent estimations is restricted to observations for which a decrease in tariffs is registered between 1996 and 2006. Figure 5 shows that there are some significant variation in tariff cuts between 1996 and 2006. For each HS chapter, Figure 5 displays the box plot of bilateral tariff cuts at the product level. The median cut lies between -4.61% for arms and -9.53% for textiles. In addition to textiles, footwear, animal & animal products and foodstuffs are the sectors with the biggest median cut. As previously shown, our results are not driven by the observations for which tariffs remain stable between 1996 and 2006; we therefore exclude them from our sample.

Figure 5: 1996-2006 cuts in bilateral tariffs, by HS chapter (%)



Source: Authors' calculation

Table 5 studies the impact of tariffs cuts on the emerging countries' exports for different specifications and subsamples. We distinguish between the extensive margin (entry in columns (1) and (4); exit in columns (2) and (5)) and the intensive one (columns (3) and (6)). The first three columns include China in the set of exporting countries, while it is excluded in the last three columns. These estimations can be seen as robustness checks of our baseline results (top of Table 4). For ease of comparison, we report the latter at the top of Table 5.

We investigate first whether our results are robust to the use of an alternative definition of tariffs. In relation to market access, what is important is not the separate changes in the market access of individual exporters, but the combined outcome of changes in the market access of all competing actors. Thus, instead of accounting only for absolute variations in bilateral tariffs, we take account also of the variations in the tariffs faced by all competitors in the same importing market for a given product in order to explain changes in preference margins, if any. We define a new explanatory variable which captures the relative variation in tariffs faced by each exporting country i for a product k on market j. This definition follows Fugazza and Nicita (2013) and is calculated as the difference in the variations in tariffs between 1996 and 2006 faced by exporting country i for product k on market j, and the variations in tariffs over 1996-2006 faced by all other foreign competitors in the same import market and for the same good $\left(\Delta_{rel} ln\tau_{ijk} = \Delta ln\tau_{ijk} - \sum_{w \neq i} \Delta ln\tau_{wjk}\right)$. The tariff faced by other foreign competitors is computed as the trade weighted average of the tariffs imposed by country i on all export partners of product k. The estimations validate our baseline results.

The second check deals with zero flows. Among missing bilateral trade flows (i.e. zero trade

flows), we can distinguish between "true" zeros (i.e. products that are never exported by a country, e.g., because of lack of endowments to produce such goods) and "non-true" zeros (i.e. products that are not traded with some but not all partners). Including all zeros could affect our estimates at the extensive margin (entry).[17] Therefore, for 1996 we identify those products that are never exported by a given emerging country and exclude them from the sample. The results are unaffected by this reduced sample.

The third robustness check follows Besedeš and Prusa (2011) and refers only to continuous export flows. As Besedeš and Prusa indicate, point-to-point comparisons (1996 vs. 2006 in our case) could be biased if relationships are short-lived. The bias may specifically affect the extensive margin. We rerun the estimations dropping all non-continuous export flows, i.e. flows that appear, disappear and then reappear continuously over the 1996-2006 period. The estimated coefficients and level of significance remain unchanged.

Our results for both the extensive and intensive margins may be driven by the limited number of products. As additional checks, we repeat the estimations dropping i) agricultural products (HS01-24), ii) mineral products (HS25-27), and iii) the specific sector of arms (HS93). The baseline results remain valid for both margins of trade.

Rather than being driven by particular products, our results may be driven by some countries (and we already mentioned the case of China). Our final robustness check deals with this potential issue by dropping all importing and exporting countries not members of the WTO in 1996 and/or 2006 (i.e. China, Russia, and Vietnam). Again, our results are not affected by these exclusions.

Table 6 compares emerging countries with other developing countries. It reproduces our baseline estimation (with HS6 product-importing country and country-pair fixed effects) for countries which are usually classified as developing or among the least developed ones and which are not included in our group of emerging exporters. For comparison, we reproduce the results of the estimations previously obtained for emerging exporting countries.

Estimated coefficients on developing exporters are slightly smaller than the ones on emerging countries once China is excluded from the set of exporters. However, the difference is significant only at the extensive margin of entry. This similarity in results is rather surprising since developing countries, and especially least developed ones, benefited from high tariff reductions granted by main importing countries on account of the development policy. Two main explanations could be provided: first, tariff cuts granted to developing countries are not always targeted towards products for which these countries are competitive. Second, non-tariff measures may be substitute tariff

[17] The intensive margin, which focuses only on strictly positive flows, is of course not affected.

Table 5: Impact of tariff cuts on emerging countries' exports: Alternative specifications and samples

Dependent variable	EM entry	EM exit	IM	EM entry	EM exit	IM
Sample	With China as exporter			Without China as exporter		
Model	(1)	(2)	(3)	(4)	(5)	(6)
Baseline						
Δ ln tariffs	-0.016	0.216[a]	-1.765[a]	-0.114[a]	0.274[a]	-2.287[a]
	(0.027)	(0.057)	(0.408)	(0.027)	(0.062)	(0.443)
Observations	838,573	184,024	141,388	812,670	159,909	118,357
R-squared	0.352	0.546	0.503	0.329	0.567	0.490
With relative variation in tariffs						
Δ ln tariffs	-0.037	0.413[a]	-2.016[a]	-0.209[a]	0.550[a]	-3.528[a]
	(0.029)	(0.048)	(0.346)	(0.029)	(0.054)	(0.390)
Observations	838,573	184,024	141,388	812,670	159,909	118,357
R-squared	0.352	0.546	0.503	0.329	0.567	0.491
Without true zeros						
Δ ln tariffs	-0.021	0.216[a]	-1.765[a]	-0.112[a]	0.274[a]	-2.287[a]
	(0.034)	(0.057)	(0.408)	(0.034)	(0.062)	(0.443)
Observations	626,863	184,024	141,388	604,182	159,909	118,357
R-squared	0.373	0.546	0.503	0.350	0.567	0.490
Without non-continuous flows						
Δ ln tariffs	-0.003	0.221[a]	-1.583[a]	-0.080[a]	0.278[a]	-2.436[a]
	(0.023)	(0.060)	(0.517)	(0.023)	(0.068)	(0.579)
Observations	777,356	107,279	91,314	759,056	89,579	73,924
R-squared	0.277	0.715	0.584	0.260	0.747	0.575
Only manufacturing						
Δ ln tariffs	-0.049	0.254[a]	-2.553[a]	-0.106[a]	0.313[a]	-3.191[a]
	(0.032)	(0.061)	(0.443)	(0.032)	(0.067)	(0.484)
Observations	717,321	166,863	129,098	696,536	144,628	107,638
R-squared	0.370	0.551	0.508	0.341	0.572	0.493
Without mineral products						
Δ ln tariffs	-0.015	0.219[a]	-1.761[a]	-0.111[a]	0.279[a]	-2.280[a]
	(0.027)	(0.057)	(0.408)	(0.028)	(0.063)	(0.442)
Observations	821,159	182,386	140,272	795,904	158,463	117,407
R-squared	0.353	0.545	0.502	0.330	0.566	0.489
Without arms						
Δ ln tariffs	-0.012	0.217[a]	-1.761[a]	-0.110[a]	0.274[a]	-2.284[a]
	(0.027)	(0.057)	(0.408)	(0.027)	(0.062)	(0.443)
Observations	835,740	183,713	141,205	809,942	159,648	118,210
R-squared	0.353	0.546	0.503	0.329	0.566	0.490
Without non-WTO members						
Δ ln tariffs	-0.110[a]	0.225[a]	-2.626[a]	-0.110[a]	0.225[a]	-2.626[a]
	(0.029)	(0.066)	(0.466)	(0.029)	(0.066)	(0.466)
Observations	693,533	138,018	102,425	693,533	138,018	102,425
R-squared	0.328	0.577	0.496	0.328	0.577	0.496

Notes: Only observations with Δ ln tariffs <0. EM: Extensive margin of trade. IM: Intensive margin of trade. Robust standard errors clustered by country pair-HS6 product in parentheses. HS6 product X importing country and country-pair fixed effects in all estimations (not reported). Columns (1)-(3): China is included in the set of exporting countries. Columns (4)-(6): China is excluded from this set.[a] p<0.01.

protection (see Limão and Tovar (2011), for some evidence of this substitution) and may affect more drastically developing exporters than emerging ones.

Table 6: Impact of tariff cuts on emerging countries' exports: Comparison with developing countries

Dependent variable	EM entry	EM exit	IM
Model	(1)	(2)	(3)
Emerging exporters (with China)			
Δ ln tariffs	-0.016	0.216[a]	-1.765[a]
	(0.027)	(0.057)	(0.408)
Observations	838,573	184,024	141,388
R-squared	0.352	0.546	0.503
Emerging exporters (without China)			
Δ ln tariffs	-0.114[a]	0.274[a]	-2.287[a]
	(0.027)	(0.062)	(0.443)
Observations	812,670	159,909	118,357
R-squared	0.329	0.567	0.490
Others developing exporters			
Δ ln tariffs	-0.062[a]	0.231[a]	-1.867[a]
	(0.004)	(0.060)	(0.461)
Observations	7,028,173	122,875	79,608
R-squared	0.185	0.615	0.539

Notes: Only observations with Δ ln tariffs <0. EM: Extensive margin of trade. IM: Intensive margin of trade. Robust standard errors clustered by country pair-HS6 product in parentheses. HS6 product X importing country and fixed effects in all estimations (not reported). [a] p<0.01.

Table 7 goes deeper in the analysis by studying whether the observed trade effects are related to the size of the tariff cuts. To do so, we discretize the change in tariffs into two bins: below and above the median cut (median cut is equal to 5.93%). As previously, Table 7 distinguishes between the extensive (entry and exit) and intensive margins; China is included in the set of exporting countries in the first three columns, but excluded in the last three columns.

Interestingly, results differ across trade margins. High tariff cuts impact the extensive margin of exit and the intensive margin, while small cuts have almost no impact on these two margins. By contrast, the extensive margin of entry is more impacted by small than by big tariff cuts. These results can be interpreted as follows: following a small reduction in tariffs, new emerging exporters are able to enter the export market. On the other hand, established exporters are not sensitive to small cuts and only big tariff cuts may impact their probability of exit or their intensive margin. Note that on average, products with below the median tariff cuts are also the ones with relatively small initial tariffs. Thus, high cuts on these products are less likely to happen; however, these products are not necessarily trivial in emerging exporters' basket.

Table 8 investigates the impact of tariff cuts for different groups of products. We refer to the classification developed by Rauch (1999) and distinguish between differentiated goods and other goods. The latter include organized exchange and reference priced goods. Some products do not

Table 7: Impact of tariff cuts on emerging countries' exports: Small vs. big cuts

Dependent variable	EM entry	EM exit	IM	EM entry	EM exit	IM
Sample	With China as exporter			Without China as exporter		
Model	(1)	(2)	(3)	(4)	(5)	(6)
Δ ln tariffs above the median	-0.057^{c}	0.225^{a}	-1.593^{a}	-0.133^{a}	0.266^{a}	-2.108^{a}
	(0.029)	(0.061)	(0.443)	(0.030)	(0.067)	(0.477)
Δ ln tariffs below the median	-0.308^{a}	0.276^{c}	-0.584	-0.253^{a}	0.216	-1.008
	(0.076)	(0.162)	(1.146)	(0.076)	(0.180)	(1.271)
Observations	838,573	184,024	141,388	812,670	159,909	118,357
R-squared	0.352	0.546	0.503	0.329	0.567	0.490

Notes: Only observations with Δ ln tariffs <0. EM: Extensive margin of trade. IM: Intensive margin of trade. Robust standard errors clustered by country pair-HS6 product in parentheses. HS6 product X importing country and country-pair fixed effects in all estimations (not reported). Columns (1)-(3): China is included in the set of exporting countries. Columns (4)-(6): China is excluded from this set. ^{a} p<0.01, ^{c} p<0.1.

appear in Rauch's classification which explains the slightly smaller number of observations. Also, Rauch (1999) provides two classifications: a conservative and a liberal one. The conservative classification minimizes the number of non-differentiated products, while the liberal one maximizes it. Table 8 reports the results using the liberal classification. Finally, differentiation is more an issue for manufacturing goods than agricultural ones. We therefore restrict our analysis to manufacturing products here.

Results differ across trade margins. At the extensive margin (entry and exit), differentiated goods are more significantly impacted by tariff cuts than non-differentiated ones, while the opposite result is observed at the intensive margin. These results are in line with Chaney (2008), who highlights that the extensive and intensive margins of trade are differently affected by the elasticity of substitution. More precisely, Chaney (2008) shows that a higher elasticity of substitution makes the extensive margin of trade is less sensitive to changes in trade barriers and the intensive margin more sensitive (and vice versa if the elasticity of substitution is low). Differentiated goods have the highest level of differentiation and therefore the lowest elasticity of substitution. Thus, our results confirm Chaney's predictions.

Table 9 examines the impact of tariff cuts, controlling for the initial and final level of tariffs faced by emerging exporting countries in 1996 and 2006. To limit the number of estimations and keep the table readable, we just consider one set of exporting countries (i.e. the one without China). The first part of Table 9 controls for 1996 tariffs. As previously, we distinguish between the extensive margins of entry and exit and the intensive one. In each case, the first regression focuses on the unconditional effect of tariff cuts on emerging countries' exports. The second regression conditions the impact of tariff cuts on the initial level of tariffs by introducing an interaction term between the two variables. The second part of Table 9 reports the same estimations but using the 2006 tariffs.

Table 8: Impact of tariff cuts on emerging countries' exports: Sector analysis

Dependent variable	EM entry	EM exit	IM	EM entry	EM exit	IM
Sample	With China as exporter			Without China as exporter		
Model	(1)	(2)	(3)	(4)	(5)	(6)
Δ ln tariffs: differentiated goods	-0.043	0.247^{a}	-2.354^{a}	-0.262^{a}	0.306^{a}	-2.924^{a}
	(0.033)	(0.064)	(0.461)	(0.055)	(0.070)	(0.503)
Δ ln tariffs: other goods	-0.101^{c}	0.248^{c}	-4.158^{a}	-0.083^{b}	0.335^{b}	-5.283^{a}
	(0.054)	(0.127)	(0.924)	(0.032)	(0.140)	(1.009)
Observations	684,849	158,756	122,535	665,147	137,417	101,944
R-squared	0.370	0.552	0.510	0.340	0.574	0.495

Notes: Only observations with Δ ln tariffs <0. EM: Extensive margin of trade. IM: Intensive margin of trade. Robust standard errors clustered by country pair-HS6 product in parentheses. HS6 product X importing country and country-pair fixed effects in all estimations (not reported). Columns (1)-(3): China is included in the set of exporting countries. Columns (4)-(6): China is excluded from this set. ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1.

The following main outcomes are observed: First, initial and final tariffs have no impact on the extensive margins, but a negative and significant one on the intensive margin. Second, we show that the positive impact of tariff cuts on the probability of having a new bilateral trade flow in 2006 grows with the initial tariffs. This result suggests that the positive impact of tariff cuts on the emergence of a new flow in 2006 is not unconditional, but is rather proportional to the level of initial tariffs. This result does not hold for the extensive margin of exit and for the intensive margin. Finally, our results indicate that the positive impact of tariffs cuts on the variations in export performances of emerging countries between 1996 and 2006 is never related to the level of tariffs in 2006. The last finding is rather reassuring since the level of final tariffs is not necessarily known before 2006 by emerging countries and therefore should not determine their export performances.

Finally, Table 10 offers a last robustness check by investigating the reaction of both trade margins to changes in tariff ceilings.[18] Tariff ceilings represent the gap between bound and applied tariffs. As theoretically shown by Francois and Martin (2004) and Sala et al. (2010), the extensive margin of trade is significantly affected by changes in ceilings, while these changes do not impact the intensive one (which in contrast responds to changes in applied tariffs). To test this theoretical conjecture on our sample, we first re-built bound tariffs for 1996 and 2006 at the tariff line level. Countries' commitments at the WTO were used and we assumed a linear phasing out for tariffs. Data at the tariff line were then averaged at the HS6 level and changes in tariff ceilings were computed using the 1996 and 2006 applied tariffs. Results suggest that changes in tariff ceilings have an impact at the extensive margin of trade (both on entry and exit), while the effect at the intensive one is not significant. These results therefore validate the theoretical result highlighted by Francois and Martin (2004) and Sala et al. (2010).

[18] We thank one of the referees for this suggestion.

Table 9: Impact of tariff cuts on emerging countries' exports: Interactions with initial and final tariffs

Dependent variable	EM entry	EM entry	EM exit	EM exit	IM	IM
Sample	Without China as exporter					
Model	(1)	(2)	(3)	(4)	(5)	(6)
Interaction with initial tariffs						
Ln 1996 tariffs	-0.112	-0.135	-0.112	-0.117	-3.418^{b}	-3.346^{b}
	(0.120)	(0.121)	(0.206)	(0.206)	(1.402)	(1.406)
Δ ln tariffs	-0.117^{a}	-0.028	0.272^{a}	0.286^{a}	-2.369^{a}	-2.628^{a}
	(0.027)	(0.045)	(0.062)	(0.081)	(0.444)	(0.525)
Δ ln tariffs X Ln 1996 tariffs		-0.262^{b}		-0.053		0.907
		(0.115)		(0.197)		(0.879)
Observations	812,670	812,670	159,909	159,909	118,357	118,357
R-squared	0.329	0.329	0.567	0.567	0.490	0.490
Interaction with final tariffs						
Ln 2006 tariffs	-0.112	-0.090	-0.112	-0.113	-3.418^{b}	-3.348^{b}
	(0.120)	(0.123)	(0.206)	(0.207)	(1.402)	(1.403)
Δ ln tariffs	-0.005	-0.012	0.384^{c}	0.385^{c}	1.049	0.994
	(0.120)	(0.120)	(0.213)	(0.213)	(1.442)	(1.444)
Δ ln tariffs X Ln 2006 tariffs		0.157		-0.021		1.751
		(0.169)		(0.382)		(1.516)
Observations	812,670	812,670	159,909	159,909	118,357	118,357
R-squared	0.329	0.329	0.567	0.567	0.490	0.490

Notes: Only observations with Δ ln tariffs <0. China is excluded from the set of exporting countries. EM: Extensive margin of trade. IM: Intensive margin of trade. Robust standard errors clustered by country pair-HS6 product in parentheses. HS6 product X importing country and country-pair fixed effects in all estimations (not reported). ^{a} p<0.01, ^{b} p<0.05, ^{c} p<0.1.

Table 10: Impact of changes in tariff ceilings on emerging countries' exports

Dependent variable	EM entry	EM exit	IM	EM entry	EM exit	IM
Sample	With China as exporter			Without China as exporter		
Model	(1)	(2)	(3)	(4)	(5)	(6)
Δ ln tariff ceilings	-0.133^{a}	0.216^{b}	0.437	-0.102^{a}	0.309^{a}	1.229
	(0.035)	(0.100)	(0.691)	(0.035)	(0.114)	(0.779)
Observations	590,921	136,057	104,711	573,129	113,280	82,992
R-squared	0.312	0.502	0.457	0.285	0.528	0.433

Notes: Only observations with Δ ln tariffs <0. EM: Extensive margin of trade. IM: Intensive margin of trade. Robust standard errors clustered by country pair-HS6 product in parentheses. HS6 product X importing country and country-pair fixed effects in all estimations (not reported). Columns (1)-(3): China is included in the set of exporting countries. Columns (4)-(6): China is excluded from this set. ^{a} p<0.01, ^{b} p<0.05.

5 Conclusion

This article analyzed the impact of tariff reductions granted to emerging countries by their main trading partners between 1996 and 2006, on bilateral trade flows. Our results suggest first that though relatively modest, tariff cuts had a non trivial impact on export performances of emerging countries. We found a positive effect of tariff cuts at both the extensive (increase in entry and reduction in exit) and intensive trade margins. Our main estimates indicate that a reduction of tariffs of 1 percentage point from 10% to 9% increases the extensive margin of entry by 0.1% and the intensive one by 2.09%, while it reduces the extensive margin of exit by 0.25%. Second, sector level analysis based on Rauch (1999)'s classification, highlights a stronger positive impact of tariff cuts at the extensive margin for differentiated goods and at the intensive one for non-differentiated products. These results validate Chaney (2008)'s predictions. Our findings, which are robust to alternative specifications and samples, also suggest that higher tariff cuts impact more the extensive margin of exit and the intensive margin, while smaller cuts have more effect at the extensive margin of entry. Finally, we show that the positive impact of tariff cuts on the emergence of a new flow in 2006 is not unconditional, but is proportional to the level of initial tariffs.

Limited cuts may have been offered by importing countries on products for which emerging countries are competitive. Similarly, tariff peaks may have been maintained in labor intensive products. Without these defensive strategies, one could have expected an even higher effect of tariff cuts on emerging exports. Besides, non-tariff measures may replace tariffs. Recurrent tariff cuts and generalized binding would mean that the positive extensive margin of trade associated with trade liberalization would depend increasingly on agreements related to non-tariff measures. Shepherd (2007) provides partial evidence of this by relying on harmonization of standards, and using a database of EU product standards in the textiles, garments, and footwear industries. However, this line of investigation is beyond the scope of the present paper and would require reliable and exhaustive databases on non-tariff measures.

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6 Appendix

6.1 Details on the construction of the 1996 tariff dataset

Since MAcMap is not available for 1996, we rely on TRAINS source files and apply the MAcMap assumptions and methodology to this source data for our initial period. If a country is missing in TRAINS, we use IDB instead. We rely on national tariff schedules at tariff line level in order to better measure the unit values of trade flows, before averaging at the HS6 level. In principle, median unit values are computed for each importing country and product. When the distribution of unit values does not allow such an approach we adopt a tiered approach by partitioning the distribution and averaging the center unit values in each tier. When too few observations are available (less than 10 for an importing country and a tariff line) this algorithm cannot be used and we use the HS6 unit value instead. It is computed as the unit value of the reference group to which the country belongs. Reference groups are constructed using Principal Component Analysis.

The richness of the tariff line is worth considering for computation of AVEs of non-ad valorem tariffs and for the treatment of tariff quotas. Non-ad valorem tariffs are comprised of specific duties, compound duties, mixed duties and technical duties, all defined at tariff line level. They are imposed by 68 out of the 151 countries covered in MAcMap. The method used here is mostly similar to that applied in the WTO World Trade Profile (http://stat.wto.org/), with some slight differences. The first difference is that when computing the AVEs of specific tariffs we rely on 3-year moving averages of unit values; we also introduce a 1,000% cap (less than 0.01% of the observations).

6.2 Countries included in the sample

Table ST1: Countries included in the sample

Exporting emerging countries	**Importing countries**
Argentina	Argentina
Brazil	Australia
Chile	Brazil
China	Canada
Colombia	Chile
Egypt	China
India	EU15
Indonesia	India
Malaysia	Indonesia
Mexico	Israel
Pakistan	Japan
Peru	Malaysia
Philippines	Mauritius
Russia	Mexico
South Africa	Norway
South Korea	Philippines
Thailand	Singapore
Turkey	South Africa
	South Korea
	Sri Lanka
	Switzerland
	Turkey
	United States
	Venezuela
	Vietnam

Table ST2: Determinants of emerging countries' exports: Basic gravity

Dependent variable	Extensive margin Probability of exports			Intensive margin Value of exports		
Model	(1)	(2)	(3)	(4)	(5)	(6)
Ln tariffs	-0.113^a	-0.105^a	-0.047^a	-0.649^a	-0.579^a	-0.222^a
	(0.002)	(0.002)	(0.003)	(0.034)	(0.033)	(0.061)
Ln(Population$_{exporter}$)	0.122^a	0.122^a		0.659^a	0.676^a	
	(0.001)	(0.001)		(0.003)	(0.003)	
Ln(GDP per capita$_{exporter}$) (current $)	0.108^a			0.608^a		
	(0.001)			(0.004)		
Ln(GDP per capita$_{exporter}$) (PPP)		0.139^a			0.830^a	
		(0.001)			(0.006)	
Ln(Population$_{exporter}$)	0.046^a	0.049^a		0.377^a	0.390^a	
	(0.001)	(0.001)		(0.002)	(0.002)	
Ln(GDP per capita$_{importer}$) (current $)	0.049^a			0.367^a		
	(0.001)			(0.002)		
Ln(GDP per capita$_{importer}$) (PPP)		0.073^a			0.535^a	
		(0.001)			(0.003)	
Ln distance	-0.124^a	-0.123^a		-0.574^a	-0.572^a	
	(0.001)	(0.001)		(0.004)	(0.004)	
Common border	0.002^c	0.001		0.130^a	0.104^a	
	(0.001)	(0.001)		(0.011)	(0.011)	
Common language	0.070^a	0.066^a		0.117^a	0.060^a	
	(0.001)	(0.001)		(0.007)	(0.007)	
Herfindahl Index$_{importer}$	-0.115^a	-0.115^a		-0.823^a	-0.819^a	
	(0.001)	(0.001)		(0.015)	(0.015)	
Fixed effects	Year	Year	Year X country-pair	Year	Year	Year X country-pair
Fixed effects	HS6	HS6	HS6 X importer	HS6	HS6	HS6 X importer
Observations	4,085,444	4,085,444	4,265,209	878,097	878,097	878,097
R-squared	0.276	0.273	0.423	0.249	0.250	0.448

Notes: Robust standard errors clustered by country pair-HS6 product in parentheses. Constant & fixed effects not reported. ^{a} p<0.01, ^{c} p<0.1.